

DIVISION OF RESEARCH, INNOVATION & SYSTEM INFORMATION
Research Initial Scope of Work
SUBMITTAL FORM - FY 17/18

- I. **Project Number:** P1204
Project Title: Effective Utility Encasement Criteria and Methods.
- II. **Task Number:** 3106
Task Title: Evaluate and develop Encasement requirements of subsurface installations.
- III. **Project Problem Statement:**
Caltrans allows utilities regulated by California Public Utilities Commission (CPUC) and private utilities (when justified) to be installed within highway right of way. Currently subsurface installations of high priority utilities and pressurized facilities are required to be encased. This helps enhance safety, avert impact to highway operations and mitigate environmental hazard situations due to mechanical failure by accidental hits to the carrier pipe. Further evaluation is needed to explore the following:

Assessment of risks associated with uncased facilities versus encased facilities for the various products being conveyed. Do all utility encroachments and State owned utilities within state's right of way need to be encased? What are the most effective encasement methods; standards, and specifications for each specific kind of utility?
- IV. **Objective:**
Comprehensive research and recommendations are required to evaluate encasement requirements and methods of encasement that will provide mechanical protection and ease of maintenance within the state right of way.
- V. **Task Description of Work and Expected Deliverables:**
1. Investigate and compare the nationwide history of pipeline dig-ins of encased pipelines versus uncased pipelines, both on and off the State system. Compare relative damage to surroundings of encased facility dig-ins versus uncased facility dig-ins. If the pipeline was uncased, in the investigator's opinion, would encasement have prevented the dig-in accident or reduced the severity?
 2. Pipeline safety regulations should be investigated to see if any encasement standards and details are available. Few agencies referred to federal requirements. Are there any federal guidelines with respect to this? Are there any CPUC guidelines/parameters with respect to the encasement requirements? Are there current industry standards that can be used? Is there any other ongoing research?
 3. Some literature notes that pipeline leaks in certain soil types will be difficult to detect because the odor added to natural gas will be scrubbed/washed away by the soil as the gas migrates up through the soil. Research from this

- phenomenon is needed to determine what soil types put detection at risk and if certain depths of cover are problematic.
4. Develop an analysis tool to help assess risks associated with uncased facilities versus encased facilities for the various products being conveyed. This could include a preferred ranking of different methods of protection and installation (for encasement pipe material, pipe wrapping, slurry backfill, concrete cap, etc.) for the different kinds of product being transported (oil, natural gas, hazardous material, electric, sewer, pressurized products, etc.) through different types of environments (factoring in: soil types, water table, depth of cover, loading.
 5. Are there other methods, beside open trench, available for replacing pipes that are not encased without disturbing the roadway surface?
 6. Evaluate the encasement requirements for various types of subsurface utility installations. Following has to be evaluated during the research process:
 - i. Are existing Caltrans encasement specifications adequate? If not, new specifications for encasement pipe material/size/thickness/type/joint type etc. have to be developed?
 - ii. Is encasement recommended for all utilities or only high-priority and pressurized facilities?
 - iii. What type of highway facilities shall require encasement? Any special conditions where the encasement is not recommended?
 - iv. Is encasement required for longitudinal installations or only for transverse?
 - v. Will encasement be requirement after a certain depth of cover is reached? Are there certain conditions under which one alternative pipe material or installation method would not be allowed (soil conditions, etc.)?
 - vi. How does encasement design/strength/size/joint connection differ for product being transported? For example: High versus low pressure, Electrical/Communication cable/fiber optics/sewer/water, etc. What is the end treatment? Need to establish requirements.
 - vii. What are the specifications for various installation methods (bedding material, material grading, linings and coatings for jack and bore)?
 - viii. Are there alternatives to encasement that provide the same level or better protection from dig-in accidents? Since one of our goals is secondary containment (like a double walled fuel tank), do we need to include leak detection? What type of leak detection? Do we need to require this system in state right of way? How is it monitored? By who? Frequency? Are relief valves required? How often, spacing, height, size?

VI. Format of Proposal:

Ideas should be submitted in the form of a whitepaper addressing the following elements: (1) Title; (2) Background/Introduction; (3) Design Challenge Area Identification/Business Value; (4) Description of Concept/Design; (5) Examples; (6) Draft Project Scope; (7) Estimated Cost; (8) General Schedule/Timeline; and (9) Contact Information.

VII. Background:

Buried utilities can pose a risk if struck, or fail due to deterioration. The Encroachment Permits Branch responds to multiple inquiries from utility companies challenging our current policies on buried utilities. Most of them question our depth of cover and encasement requirements. For example, some utility companies claim that encasing their pipelines will interfere with the inspection of the utility. Claims are also made that encasement increases the risk of corrosion from the carrier pipe coming in contact with the encasement.

Caltrans policy is to encase high priority and pressurized facilities.

A Preliminary Investigation was done by DRISI to study regulations and policies on underground utility encasement from other state DOTs. The investigation pointed out that states such as Missouri, Alabama, Iowa, Virginia, Texas, Washington, and Michigan have regulations and policies that require specific underground utilities to be encased. However, some states, such as New Hampshire, Oregon, and Massachusetts either do not have regulation or policies for underground utility encasement or did not provide an answer to the DIR investigation.

VIII. Estimate of Duration: 15 months

IX. Related Research:

Preliminary Investigation: Effective Methods to Protect Underground Utilities

X. Deployment Potential:

The deployment potential is high. The Preliminary Investigation: Effective Methods to Protect Underground Utilities will be completed in the spring of 2017. The results will be added to the requested research project.

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